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EFFECTS OF HARVESTING AND SHELLING METHODS AND LENGTH OF STORAGE ON THE GERMINATION OF COLLEGE YELLOW FLINT SEED CORN [1]

ANDRES P. AGLIBUT AND JOSE M. LAWAS

WITH TWO TEXT FIGURES

The method of harvesting and shelling seed corn did not affect viability very much even after 12 months of storage. The dry-season corn crop harvested by hand had the following mean percentages of germination in 12 months of observation: hand-shelled, 93.04 ± 0.50; mechanically shelled, 91.54 ± .55. Among the machine-harvested ears the hand-shelled seeds had an average germination percentage of 92.89 ± .50, and the machine-shelled seeds, 91.39 ± .55. For the wet-season crop the corresponding percentages were 96.25 ± .37; 94.17 ± .46; 95.42 ± .41 and 94.33 ± .45 in six monthly tests. The viability of stored corn seeds after 12 months was as follows: hand-harvested hand-shelled seeds, 89.5 per cent; hand-harvested machine-shelled seeds, 89 per cent; machine-harvested hand-shelled seeds, 91.5 per cent; and machine-harvested machine-shelled seeds, 88 per cent.

Poor methods of processing and storing corn seeds lead to considerable losses of valuable seeds on account of poor germination. High corn production to a unit of land is the result of planting seeds that are properly handled, processed, and stored.

Dungan and Koehler (1944) noted that newly dried disease-free seed corn, selected carefully and processed by hand, retains its viability and vigor so well as to produce practically as good yields when three years old as when new. Wenholz (1915) stated that seed corn that has been well cared for should give 98 per cent germination in the first year of storage and should keep for at least three years, giving 90 per cent germination the second year and 80 per cent the third. According to Leus (1930), corn seeds 8, 18, and 32 months old, harvested in the rainy season, gave 100 per cent germination in the laboratory, whereas seeds 12 months old gave poor germination.

Yango (1938) found no significant difference in percentage of germination between hand-shelled and machine-shelled Calauan Yellow Flint and Lagkit corn seeds. On the other hand, Huelsen and Brown [2] showed that mechanically harvested and shelled sweet corn is inferior in germination to seeds harvested and shelled by hand.

The present study was undertaken to determine the effects of harvesting and shelling methods and length of storage on the via-

[1] Central Experiment Station Contribution No. 1803. Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture, June, 1954. Prepared in the Department of Agricultural Engineering under the direction of the senior author.

[2] W. A. Huelsen and W. N. Brown, *University of Illinois Bull. No. 561.*

[THE PHILIPPINE AGRICULTURIST, Vol. 38, Nos. 6-7, Nov.-Dec., 1954, appeared in March, 1955.]
THE PHILIPPINE AGRICULTURIST, VOL. 38, No. 8, JANUARY, 1955

bility of seed corn as shown by the percentage of monthly germination. It was conducted in the College Experiment Station field and in the Department of Agricultural Engineering from December, 1952, to May, 1954.

MATERIALS AND METHODS

The dry-season corn crop was harvested on March 28, 1953, and the wet-season corn crop, on November 23, 1953, with a McCormick-Deering No. 24 two-row mounted corn picker-husker. Previous to harvesting with the picker-husker, 100 ears were picked by hand from the two crops.

Of the 100 hand-harvested ears of College Yellow Flint corn,[3] 50 were hand-shelled and the remaining 50 were shelled with a McCormick-Deering No. 30 two-cylinder corn sheller with a rated capacity of about 90 bushels (44 cavans) an hour. One hundred ears were selected from the corn harvested by the corn picker-husker, and 50 were shelled by hand and the other 50 by the sheller.

The dry-season corn was shelled on April 1, 1953; the grains had an average moisture content of 22.13 per cent. The wet-season samples were shelled on December 20, 1953, when the ears of corn were partially air-dry; the kernels had a moisture content of 18.79 per cent. Kernels crushed and damaged by the sheller were separated from the sound grains and analyzed.

Before the ears of corn were shelled they were first dried in the sun for several days. After shelling, the corn seeds were again dried in the sun until their weight became constant. The percentages of broken and unbroken seeds were determined.

The four lots of dried corn seeds were stored in gunny sacks soaked in 5 per cent solution of DDT.[4] The sacks were suspended from the ceiling of the storage room.

From each seed lot 200 kernels of uniform size were divided into eight groups of 25 kernels each for every germination test. The eight groups were randomly assigned so that a group of 25 grains was planted in a quarter portion of a seedbox. Thus, in each box were germinated 100 kernels, 25 from each of the four seed lots. This system made possible the repetition of the tests on samples from the 25-kernel replication with the possible reduction of variation due to location.

In each of the eight germinating boxes four rows, 6 centimeters apart, were prepared, and 25 kernels were planted equidistantly in the row to a depth of about two centimeters. Within two weeks the time and total emergence of the germinated seeds were recorded, after which the soil in the germinating boxes was again pepared for the next germination test. The monthly tests for the dry-season

[3] Verified by Dr. Dioscoro L. Umali of the Department of Agronomy.
[4] Suggested and supplied by Dr. Getulio Viado of the Department of Entomology.

crop began in March. 1953, and continued for 12 months. The tests for the wet-season crop began in December, 1953, and lasted for six months.

RESULTS AND DISCUSSION

Effect of method of harvesting on germination. The method of harvesting did not affect considerably the percentage of garmination of seeds in both seasons (table 1).

Effect of method of shelling on germination. The monthly percentage of germination was practically the same for hand- and machine-shelled seeds from hand-harvested ears and for seeds harvested in both seasons (table 1). Likewise, the method of shelling hardly had any influence on the percentage of germination of the machine-harvested seeds in both seasons.

Effect of weather on germination. Almost all the tests showed decreased percentage of germination in July, August, and September when heavy rainfall waterlogged the seedboxes (figs. 1 and 2). In the dry-season planting this effect was not observed.

Effect of length of storage on germination. After a year of storage corn seed still retained much of its viability (table 1).

Damage of corn seed by the picker-husker. There can be no question about the rough treatment the corn ears receive when harvested by a corn picker. Iñigo [5] stated that the total percentage of loss was 6.09, which was equivalent to 1.04 cavans a hectare. Villaviza [6] also reported that with the use of a corn picker, the total loss was 1.16 cavans a hectare in the wet season and .98 cavan in the dry season. In the present study, the damaging effect of the machine-harvesting and hand-shelling is shown in table 2. The damages and losses from picking corn by machine, according to Hurlbut (1947), can be materially affected by the operator's judgment and ability in adjusting the gathering points, snapping rolls, and steering the machine along the rows.

Damage caused by corn sheller. The machine-shelled samples had much higher average percentages of damaged and cracked seeds than the hand-shelled samples (table 2). Because the sheller was usually operated at a speed of 710 rpm., some of the kernels might have been damaged more or less severely. Consequently, the germination percentage of the machine-shelled kernels would be less as such injuries, although undetected ordinarily, would result in a slightly reduced emergence during germination (Livingston, 1952).

[5] M. C. Iñigo, "A Study on the Mechanization of the Corn Culture with Special Reference to the Performance of the Corn Picker." (Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture, 1951. Unpublished.)

[6] Q. N. Villaviza, "A Study of the Mechanization of the Corn Culture with Special Reference to the Performance of the Corn Picker." (Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture, 1952. Unpublished.)

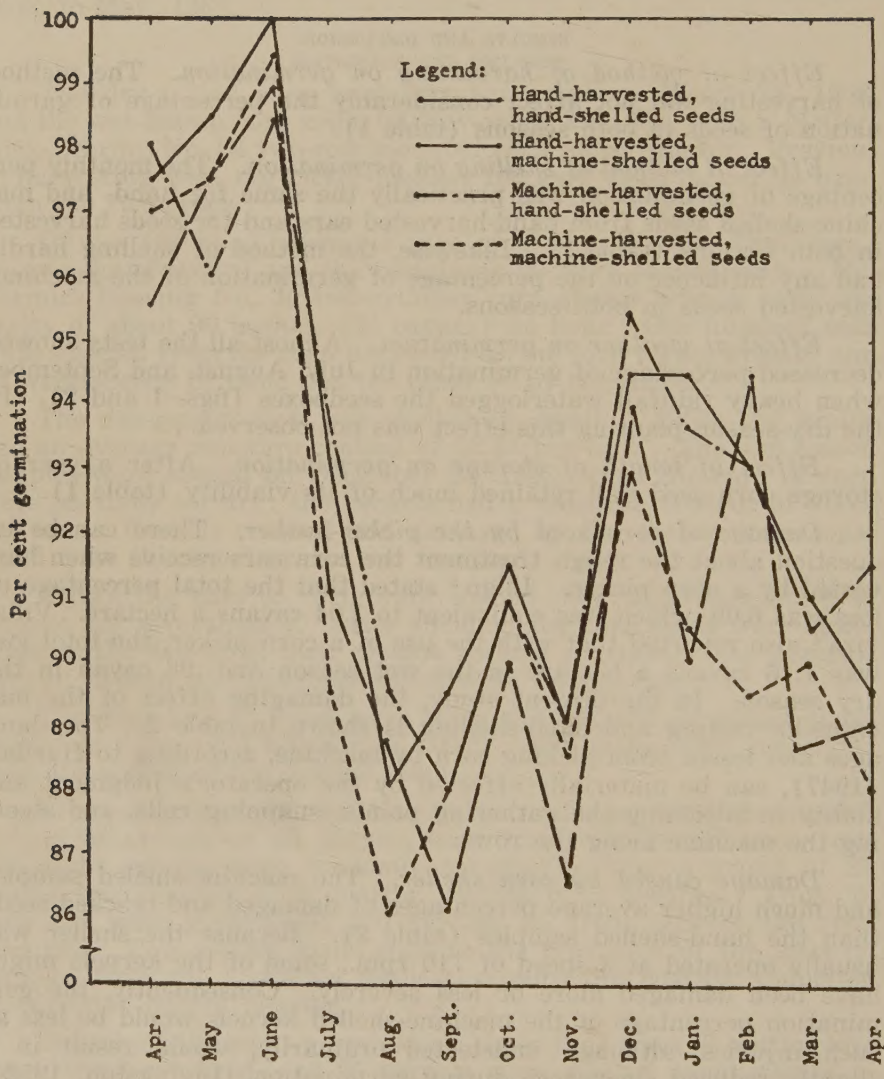

Fig. 1.—Monthly percentage germination of College Yellow Flint corn seed from the dry-season crop.

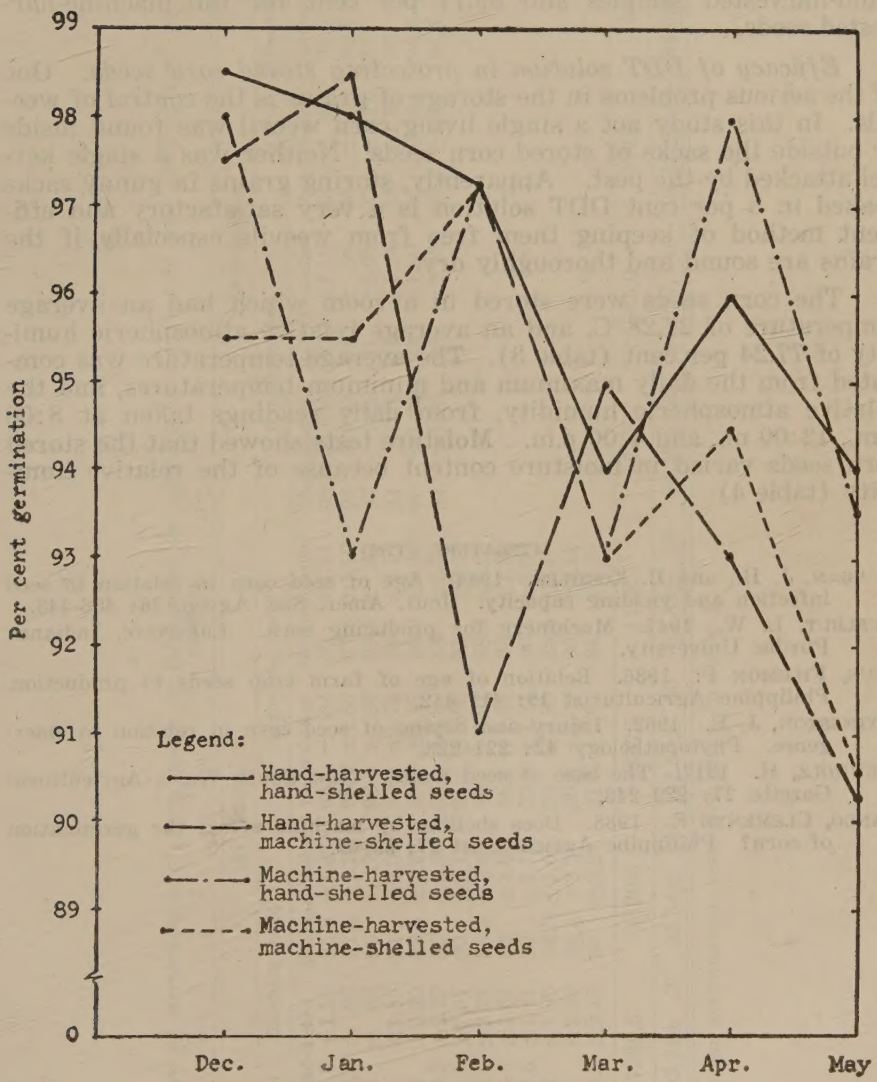

Fig. 2.—Monthly percentage germination of College Yellow Flint corn seed from the wet-season crop.

The average physical damage caused by the corn sheller, mainly crushing and cracking of the kernels, was 31.86 per cent for the hand-harvested samples and 39.77 per cent for the machine-harvested seeds.

Efficacy of DDT solution in protecting stored corn seeds. One of the serious problems in the storage of grains is the control of weevils. In this study not a single living corn weevil was found inside or outside the sacks of stored corn seeds. Neither was a single kernel attacked by the pest. Apparently, storing grains in gunny sacks soaked in 5 per cent DDT solution is a very satisfactory and efficient method of keeping them free from weevils especially if the grains are sound and thoroughly dry.

The corn seeds were stored in a room which had an average temperature of 27.28°C. and an average relative atmospheric humidity of 77.24 per cent (table 3). The average temperature was computed from the daily maximum and minimum temperatures, and the relative atmospheric humidity, from daily readings taken at 8:00 a.m., 12:00 m., and 4:00 p.m. Moisture tests showed that the stored corn seeds varied in moisture content because of the relative humidity (table 4).

LITERATURE CITED

DUNGAN, J. H., and B. KOEHLER. 1944. Age of seed corn in relation to seed infection and yielding capacity. Jour. Amer. Soc. Agron. 36: 436-443.

HURLBUT, L. W. 1947. Machinery for producing corn. Lafayette, Indiana: Purdue University.

LEUS, FILEMON P. 1936. Relation of age of farm crop seeds to production. Philippine Agriculturist 19: 411–412.

LIVINGSTON, J. E. 1952. Injury and drying of seed corn in relation to emergence. Phytopathology 42: 221–223.

WENHOLZ, H. 1917. The case of seed maize. New South Wales Agricultural Gazette 27: 229–243.

YANGO, CLEMENTE E. 1938. Does shelling by machine affect the germination of corn? Philippine Agriculturist 27: 59–69.

TABLE 1.—*Percentage of germination of corn seeds as influenced by methods of harvesting and shelling and length of storage*

NUMBER OF GERMINATION TEST [a]	DRY SEASON				WET SEASON			
	Hand-harvested		Machine-harvested		Hand-harvested		Machine-harvested	
	Hand-shelled	Machine-shelled	Hand-shelled	Machine-shelled	Hand-shelled	Machine-shelled	Hand-shelled	Machine-shelled
1	97.5 ±1.10	95.5 ±1.47	98 ± .94	97 ±1.21	98.5 ± .86	97.5 ±1.10	98 ± .94	95.5 ±1.47
2	98.5 ± .86	97.5 ±1.10	96 ±1.39	97.5 ±1.10	98 ± .94	98.5 ± .86	93 ±1.80	95.5 ±1.47
3	100 ± .00	99 ± .70	98.5 ± .86	99.5 ± .49	97 ±1.21	91 ±2.03	97 ±1.21	97 ±1.21
4	93 ±1.80	91 ±2.03	93.5 ±1.74	89.5 ±2.17	94 ±1.68	95 ±1.54	93 ±1.80	93 ±1.80
5	88 ±2.30	88.5 ±2.26	89.5 ±2.17	86.0 ±2.45	96 ±1.39	93 ±1.80	98 ± .94	94.5 ±1.61
6	89.5 ±2.17	86 ±2.45	88 ±2.30	88 ±2.30	94 ±1.68	90 ±2.12	93.5 ±1.74	90.5 ±2.07
7	91.5 ±1.97	90 ±2.12	91 ±2.03	91 ±2.03				
8	89 ±2.21	86.5 ±2.42	89 ±2.21	88.5 ±2.26				
9	94.5 ±1.61	94 ±1.68	95.5 ±1.47	93 ±1.80				
10	94.5 ±1.61	90 ±2.12	93.5 ±1.74	90.5 ±2.07				
11	93 ±1.80	94.5 ±1.61	93 ±1.80	89.5 ±2.17				
12	91 ±2.03	88.5 ±2.26	90.5 ±2.07	90 ±2.12				
13	89.5 ±2.17	89 ±2.21	91.5 ±1.97	88 ±2.30				
Total	1209.5	1190.0	1207.5	1188.0	577.5	565.0	572.5	566.0
Mean	93.04± .50	91.54± .55	92.89± .50	91.39± .55	96.25± .37	94.17± .46	95.42± .41	94.33± .45

[a] Intervals between germination tests are given in table 2.

TABLE 2.—*Weight of good and damaged shelled corn* [a]

CORN SEED	DRY SEASON					WET SEASON				
	Seed undamaged		Seed damaged			Seed undamaged		Seed damaged		
	Kilogram	Per cent	Slight external damage	Severe external damage	Total percentage	Kilogram	Per cent	Slight external damage	Severe external damage	Total percentage
			kg.	*kg.*				*kg.*	*kg.*	
Hand-harvested Hand-shelled	4.420	98.27	.049	.029	1.73	3.840	98.64	0.39	.014	1.36
Hand-harvested Machine-shelled	3.185	64.54	.452	1.298	35.46	2.615	71.74	.255	.775	28.26
Machine-harvested Hand-shelled	4.385	92.12	.274	.101	7.88	3.872	94.44	.190	.038	5.56
Machine-harvested Machine-shelled	2.575	55.38	.519	1.556	44.62	2.505	65.08	.526	.818	34.92

[a] Percentage was based on the total weights of samples for each season.

TABLE 3.—*Average monthly temperature and relative atmospheric humidity in the storage room*

YEAR	MONTH	AVERAGE MONTHLY TEMPERATURE	AVERAGE MONTHLY RELATIVE ATMOSPHERIC HUMIDITY
		°C.	*per cent*
1953	April	28.7	67.4
	May	28.8	75.1
	June	28.6	76.3
	July	27.6	76.5
	August	25.6	77.3
	September	27.5	79.1
	October	27.0	86.3
	November	27.6	84.2
	December	25.6	87.6
1954	January	25.6	77.9
	February	26.0	75.1
	March	29.9	64.5
	April	26.2	76.8
Average		27.28	77.24

TABLE 4.—*Average moisture content of germinated corn seeds*

NUMBER OF GERMINATION TEST	DRY SEASON		WET SEASON	
	Interval between germination tests	Moisture content of germinated seeds	Interval between germination tests	Moisture content of germinated seeds
	days	*per cent*	*days*	*per cent*
1	0	22.13	0	18.79
2	30	11.56	31	12.02
3	34	11.71	31	13.49
4	27	12.84	28	14.41
5	31	13.14	29	14.56
6	31	14.55	24	15.05
7	30	15.01		
8	31	15.39		
9	31	16.70		
10	30	17.83		
11	31	18.64		
12	28	18.88		
13	31	19.57		

AUROFAC AND COW MANURE AS SUPPLEMENTS TO THE COLLEGE BROODING RATION FOR CHICKS [1]

ELISEO N. ALCASID III

Probably because of its antibiotic element, the Aurofac supplement increased the rate of growth and lowered the mortality more than did dried cow manure. It also promoted earlier feathering than dried cow manure. There were more class "A" birds of a uniformly deeper color in the Aurofac lot than in the cow manure lot. Both lots required practically the same amount of feed to produce the same gain in weight.

Fronda and Asuncion (1949) found that chicks fed with dried cow manure [2] were uniformly heavier and had lower mortality than those that received an unsupplemented ration. Hunt and his coworkers (1941) and Rubin and Bird (1946) reported the presence of a growth-promoting factor in cow manure.

Matterson, Singsen, Decker, and Kozeff (1951) reported that aureomycin and penicillin stimulate growth and decrease mortality in chicks. Catalan (1953) found that Aurofac increased the efficiency of feed utilization. Santos (1952) observed that APF decreased the mortality of chicks. Katigbak (1953) noted that New Hampshire chicks given rations containing 10 parts copra meal, 15 parts fish meal, and 1 part Aurofac showed the best rate of growth and the least mortality.

To determine how cow manure compares with Aurofac as a feed supplement for growing chicks, this study was conducted in the Department of Animal Husbandry from January, 1953, to December, 1953.

MATERIALS AND METHODS

Three trials of 12 weeks each were conducted. Three hundred day-old New Hampshire chicks were equally divided at random into two lots. They were wingbanded and individually weighed every week of the trial. Both lots were raised in battery brooding cages

[1] Central Experiment Station Contribution No. 1804. Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture, April, 1954. Prepared in the Department of Animal Husbandry under the direction of Professor F. M. Fronda.

[2] The proximate analysis of cow manure as determined in the Central Experiment Station Chemical Laboratory:

Moisture	11.44
Crude protein (N x 6.25)	10.35
Crude fat (ether extract)	2.04
Carbohydrates (N.F.E.)	32.97
Calorific value (100 grams)	192.00
Crude fiber	25.62
Ash	17.58

with artificial heat until the birds were four weeks of age, when they were transferred to unheated battery rearing cages.

The two lots were given the College all-mash chick ration which consists of the following ingredients, all parts by weight:

Rice bran	55
Ground corn	20
Fish meal	20
Copra meal	5

Common table salt was added to the ration at the rate of 1 per cent of the mash. Chopped green feed, *Leucaena glauca* (Linn.) Benth., was given at least three times a week. Grit, ground shells, and fresh water were supplied at all times.

The ration of lot I was supplemented with Aurofac at the rate of ½ part to 99.5 parts of the mash. The ration of lot II was supplemented with dried cow manure at the rate of 10 parts to 90 parts of the mash. Both rations were given in the form of dry mash and made available to the chicks at all times of the day. The treatment given to both lots was the same.

Initial and biweekly weights, mortality, and amount and cost of feed consumed were recorded.

RESULTS AND DISCUSSION

Rate of growth. The average weights of the chicks at different ages were used to determine the influence of the feed on the rate of growth.

The average weights of the chicks in the combined trials (table 1 and fig. 1) showed that the chicks in the Aurofac-supplemented lot were consistently heavier than those in the cow manure-supplemented lot. The difference between the two lots was 166.1 grams in trial 1, 129.6 grams in trial 2, and 111.0 grams in trial 3. These differences are highly significant. However, the chicks that received the ration supplemented with cow manure were more uniform in size than those that received the ration supplemented with Aurofac. On the twelfth week the chicks fed cow manure averaged 90.0 grams more than the New Hampshires raised by Catalan (1953) on an unsupplemented ration.

Mortality. The death rate was consistently higher in lot II in the three trials (table 2). The causes of this unusually high mortality were roup, which was partly brought about by the changing weather during the period, and coccidiosis. Sudden change of temperature greatly affected the vitality of the birds.

The lower death rate in lot I may be attributed partly to the presence of aureomycin, which probably inhibited the growth of harmful bacteria and other injurious microorganisms in the digestive tract of the chicks. When compared to the findings of previous

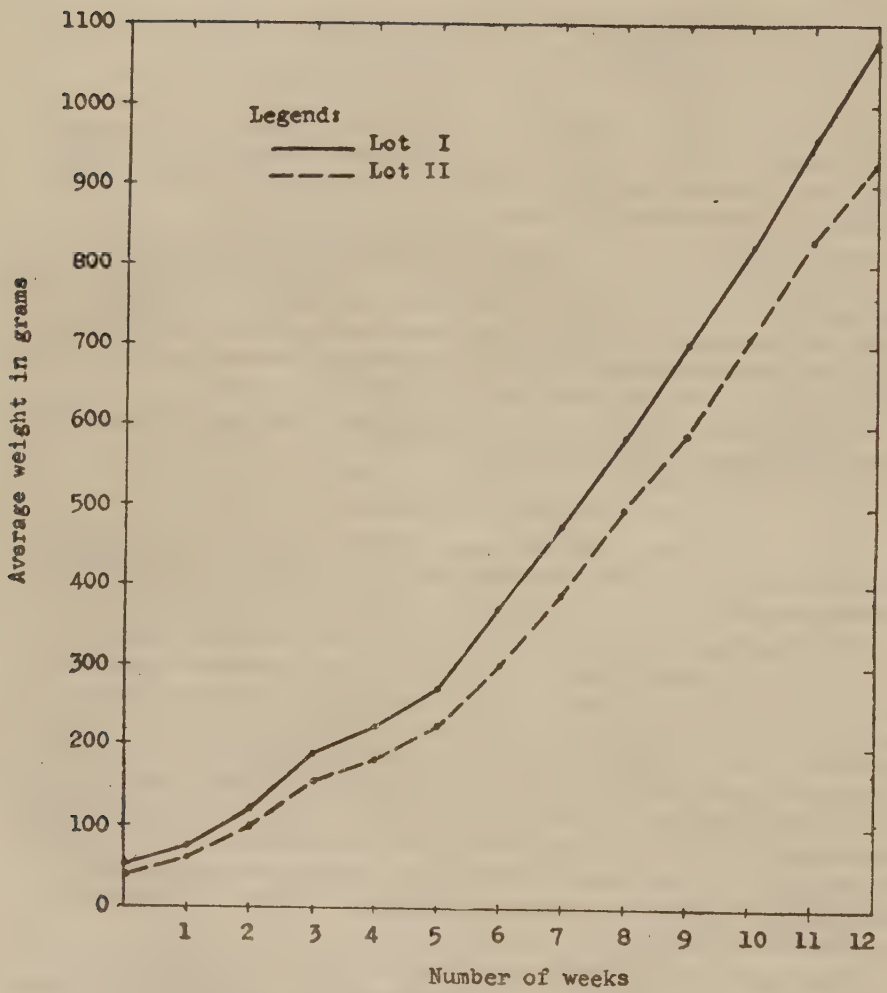

Fig. 1.—The average weights of the chicks in the combined trials

workers, however, the mortality in this study was slightly higher. Santos (1952) recorded an average mortality of only 2.61 per cent and Catalan (1953), only 7.1 per cent.

Feed consumption and cost. In the three trials, the lot given Aurofac had a higher feed consumption than the lot given cow manure. However, the chicks in both lots required practically the same amount of feed to produce a kilogram gain in weight so that in this respect the Aurofac lot was only equal to the cow manure lot. Lot I had greater returns above the cost of feed than lot II.

Feathering. The birds in lot I feathered earlier, and they had a deeper color than those in lot II. More class "A" birds were produced in lot I than in lot II.

LITERATURE CITED

FRONDA, F. M., and DOROTEO C. ASUNCION. 1948. Cow manure as a supplement to a ration for growing chicks. Philippine Agriculturist **32**: 257–259.

CATALAN, MARCELO V. 1953. The influence of Aurofac as a supplement to the College growing ration for chicks. Philippine Agriculturist **36**: 295–302.

HUNT, C. H., *et al.* 1941. Studies on riboflavin and thiamin in rumen contents of cattle. Jour. Nutrition **21**: 85–92.

KATIGBAK, TEODORO V. 1953. The influence of three rations on growing chicks. Philippine Agriculturist **37**: 175–184.

MATTERSON, L. D., E. P. SINGSEN, L. DECKER, and A. KOZEFF. 1951. A comparison of several antibiotics as growth stimulants in practical chick-starting rations. Storrs Agric. Exper. Sta. Bull. 275: 1–19.

RUBIN M., and H. R. BIRD. 1946. A chick growth factor in cow manure. I. Its non-identity with chick growth factors previously described. Jour. Biol. Chem. **163**: 327-392.

SANTOS, SEVERINO R. 1952. The influence of APF as a supplement to growing chick rations containing varying amounts of fish and mongo (*Phaseolus aureus* Linn.) meals. Philippine Agriculturist **36**: 83–89.

TABLE 1.—*Average initial and biweekly weights of chicks in grams*

AGE	TRIAL 1		TRIAL 2		TRIAL 3		AVERAGE	
	Lot I	Lot II	Lot I	Lot II	Lot I	Lot II	Lot I	Lot II
1 day	37.0	37.7	40.1	38.8	39.5	37.4	38.8	38.0
2 week	94.8	79.7	122.4	105.8	95.9	92.1	104.4	92.5
4 "	201.1	147.4	217.7	199.6	210.4	174.9	209.8	174.0
6 "	365.2	263.2	383.6	310.7	331.3	298.8	360.0	290.9
8 "	545.3	436.6	621.1	525.6	543.8	474.6	570.0	478.9
10 "	822.3	677.3	825.5	740.2	768.7	684.8	805.5	700.1
12 "	1086.8	920.7	1077.2	947.6	1018.6	907.6	1060.9	923.3

TABLE 2.—*Rate of mortality*

ITEM	TRIAL 1		TRIAL 2		TRIAL 3		TOTAL	
	Lot I	Lot II	Lot I	Lot II	Lot I	Lot II	Lot I	Lot II
Number of chicks at the start	50	50	50	50	50	50	150	150
Number of chicks that died	7	17	3	5	6	10	16	32
Number of weanlings after 12 weeks	43	33	47	45	44	40	134	118
Percentage of mortality	14	34	6	10	12	20	10.7	21.3

TABLE 3.—*Amount and cost of feed consumed and returns above feed cost*

ITEM	TRIAL 1		TRIAL 2		TRIAL 3		TOTAL	
	Lot I	Lot II	Lot I	Lot II	Lot I	Lot II	Lot I	Lot II
Amount of feed consumed, kg.	149.1	109.4	160.1	125.4	154.8	120.5	464.0	355.3
Cost of feed consumed, pesos [a]	₱47.71	₱30.63	₱51.23	₱35.11	₱49.54	₱33.74	₱148.48	₱99.48
Number of birds at 12 weeks	43	33	47	45	44	40	134	118
Weight of weanlings produced, kg.	47.8	31.3	50.6	42.6	44.8	36.3	143.2	109.2
Amount of feed required to produce a kilogram gain, kg.	3.1	3.5	3.2	2.9	3.5	3.3	3.2	3.3
Cost of feed required to produce a kg. gain, pesos	₱0.99	₱0.98	₱1.02	₱0.81	₱1.12	₱0.92	₱1.02	₱0.92
Returns from sales of weanlings, pesos [b]	₱119.50	₱78.25	₱126.50	₱106.50	₱112.02	₱90.75	₱358.00	₱273.00
Actual returns above cost of feed from all weanlings, pesos	₱71.79	₱47.62	₱75.27	₱71.39	₱62.46	₱57.01	₱209.52	₱173.52

[a] Cost of a kilogram of feed was ₱0.32 for lot I and ₱0.28 for lot II.
[b] Price of weanlings was ₱2.50 a kilogram live weight.

ALPHA-NAPHTHALENE ACETIC ACID TO SUPPRESS SUCKERS IN DECAPITATED TOBACCO PLANTS [1]

JUVENAL R. RAGUINI

One drop of alpha-naphthalene acetic acid to a plant inhibited the growth of suckers very little, but it delayed sucker formation. The plants which received two to three drops of the chemical had thicker, broader, and coarser but less gummy and hairy leaves. Two drops of the chemical favored rooting at the upper 10 internodes and nodes of the plants. Three drops caused the leaves to droop one week after application.

When the expenses of seedbed preparation and pricking, charges on depreciation of implements and curing shed, land rent, and seed cost were excluded, the chemical method of suckering was cheaper than the hand method by ₱16.16 a hectare. The value of increase in production was ₱0.24 for every 16-square-meter plot, or ₱150.00 to a hectare.

Before the chemical method of sucker growth control can be recommended for extensive use, the effect of the chemical on the quality of tobacco leaf must be further studied.

Topping tobacco just before harvest is a general practice to stimulate the growth of the remaining leaves. When the apical buds of tobacco plants are removed, large shoots or lateral branchings develop from the axillary buds. These shoots or suckers must be removed once or twice between topping and harvesting to promote better growth and quality of the leaves. Removal of the suckers by hand is time consuming. In addition, workers damage the leaves every time they walk through the plantation to remove the suckers. Suppressing sucker growth with alpha-naphthalene acetic acid might prove advantageous. It is necessary then to determine the number of drops of the chemical [2] sufficient to suppress sucker growth and the difference in cash returns between the manual and chemical methods of suckering.

The work was conducted in the Division of Fibers and Oils of the Department of Agronomy, College of Agriculture and Central Experiment Station, Los Baños, Laguna, from November, 1952, to June, 1953.

Gapen (1948) reported that one drop of methyl-naphthalene acetic acid applied to stalk-cut tobacco in the greenhouse seemed to retard sucker growth.

Steinberg (1949) found that with one drop of napthyl acetate and its derivatives under greenhouse conditions, branching was sup-

[1] Central Experiment Station Contribution No. 1805. Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture, October, 1954. Prepared in the Department of Agronomy under the direction of Associate Professor Pedro A. David.

[2] Fifteen milligrams of alpha-naphthalene acetic acid powder dissolved in 100 milliliters of isobutyl alcohol.

pressed entirely and leaf yield was equal to or greater than that obtained through suckering by hand.

Petersen (1952), using 18 Havana Seed Tobacco, reported successful sucker control with different salts and molar solutions of maleic hydrazide.

MATERIALS AND METHODS

Viriginia Bright Leaf tobacco (CA 412) seeds were sown in a seedbox. When the seedlings had two or three pairs of leaves, they were pricked about five centimeters apart in another seedbox. The flats were placed in the shade and moderately watered every morning. The seedlings were gradually exposed to the sun to harden. Weeding and control of pests were done by hand.

In the late afternoon of December 18, 1952, uniform and vigorous seedlings were transplanted to the field by hand. They were watered before they were pulled to facilitate the operation. The seedlings were distanced 80 centimeters apart between rows and 70 centimeters in the row. They were set vertically and singly in the holes, up to their necks with their roots spreading out. The soil surrounding the plant was packed lightly to give the roots a firm hold. The seedlings were watered immediately and shaded with pieces of banana bracts for a week to prevent wilting. All the missing hills were replanted four days after.

The transplanted plants were watered every afternoon for 10 days. Cultivation with a hoe and a trowel commenced 10 days after transplanting. Subsequent cultivations were done weekly until harvesting began. The plants were hilled-up twice when they were 25 to 30 centimeters high.

Worms and other pests were controlled by spraying the plants weekly for seven weeks with "Pest-B-Gon" (50 per cent wettable DDT)[3] and by hand-picking the pests every morning or late in the afternoon until all the leaves of the plants had been harvested.

High topping of the plants was done at the flower bud and flowering stages by cutting the stalks horizontally between the second and third upper leaves. A concave area to hold the chemical was made on the cut stalk by removing the rind with a knife or merely pinching it with the fingers. Just after topping in the morning, at noon, or late in the afternoon, the chemical was applied with a medicine dropper with a capacity of 20 drops or 1 milliliter.

Priming was begun one week after topping and application of the chemical in the chemical method and one week after topping in the manual method. Harvesting started in the later part of March, or about ten weeks after transplanting, and ended in June, 1953.

Before the leaves were poled, they were classified according to size, soundness, and degree of maturity. The leaves were wilted be-

[3] Recommended by Dr. G. B. Viado of the Department of Entomology and supplied by Getz Bros. and Company.

fore they were poled according to the method used by Baltazar (1937). They were sun-cured by the method described by Collins (1940). After the leaves had been thoroughly cured, they were classified according to color, size, and soundness. They were bundled into groups of 30 to 35 leaves and then placed in separate boxes. The weight of the cured leaves from the different plots was recorded.

All expenses and the hours spent on each plot were recorded.

RESULTS AND DISCUSSION

Plants topped at the flower bud stage were darker and increased in height significantly more than those topped at the flowering stage (table 1). There was no marked difference in mean number of leaves to a plant when the plants were topped at the flower bud and flowering stages.

The leaves of the treated plants were thicker, broader, and coarser but less gummy and hairy than those which did not receive any treatment.

Two or three drops of alpha-naphthalene acetic acid retarded sucker growth for two weeks, and most of the shoots that came out had dried tips and were not able to open their leaves. One drop to a plant inhibited the growth of suckers very little. However, it delayed sucker formation; the suckers from the control had a mean length of 16.39 centimeters and those from the one-drop treatment, 6.42 centimeters. Two drops to a plant resulted in root development at the upper 10 internodes and nodes. The leaves drooped when the plants were given three drops of the chemical. The plants which received the chemical matured five to seven days earlier than those which were not chemically treated. The chemical had the same effect when applied at the flower bud and at the flowering stage.

The cured leaves of the plants that received the chemical were light brown at the edges and light yellow towards the midrib. The hand-suckered plants had light yellow leaves.

The average yield (table 3) of the plots which were treated with two to three drops of the chemical was 2,214.55 grams a 16-square-meter plot, or 1,384.09 kilograms to a hectare. The hand-suckered plots yielded 1,883.80 grams to a 16-square-meter plot, or 1,177.38 kilograms to a hectare. Based on the average selling price of ₱77.85 [4] for every kilogram bale, the value of production was ₱1.50 a 16-square-meter plot, or ₱936.97 to a hectare for the treated plots; ₱1.28 for a 16-square-meter plot, or ₱797.04 to a hectare for the hand-suckered plots. The computed yield on the hectare basis compares favorably with those of the Viriginia types reported by Rimando (1952) and that reported by Ramos.[5]

[4] Average monthly prices of cured tobacco leaves were released by the Bureau of Commerce in 1952 and compiled by the Department of Agricultural Economics.

[5] Jose C. Ramos, "Local Flue-cured Tobacco Production." (Paper read before the 8th Pacific Science Congress, U.P., Diliman, Quezon City, November 16 to 28, 1953).

When the expenses of seedbed preparation and pricking, charges on depreciation of implements and curing shed, land rent, and seed cost were excluded, the total labor cost was ₱0.91 [6] for every 16-square-meter plot, or ₱567.67 to a hectare, for the two-drop treatment; ₱0.92 for a 16-square-meter plot, or ₱568.91 to a hectare, for the three-drop treatment; and ₱0.94 for a 16-square-meter plot, or ₱584.45 to a hectare, for the hand method. The alpha-naphthalene acetic acid cost ₱2.40 a 12-ounce bottle. Ramos [7] found the cost of production in La Union province to be ₱716.00 to ₱896.00 a hectare and the net income, ₱53.00 to ₱206.00 from a hectare.

The chemical method of suckering was cheaper by ₱16.16 than the hand method. The value of the increase in yield of the treated plots was ₱0.24 for every 16-square-meter plot; ₱150.00 more was realized when sucker growth was inhibited by alpha-napthalene acetic acid.

Before the chemical method of sucker growth control can be recommended for extensive use, the effect of the chemical on the quality of tobacco leaf must be further studied.

LITERATURE CITED

BALTAZAR, EULALIO P. 1937. Trial manufacture of cigarette, chewing, and pipe tobacco in the College of Agriculture. Philippine Agriculturist 26: 277–386.

COLLINS, J. C. 1940. Turkish tobacco culture and marketing in Southern Rhodesia. Rhodesia Agric. Jour. 38: 733–751.

GAPEN, C. E. 1948. Growth regulating chemicals. Country Gentleman 97: 50–51.

PETERSEN, E. L. 1953. Controlling tobacco sucker growth with maleic hydrazide. Agron. Jour. 44: 332–334.

RIMANDO, VICTOR C. 1952. A comparison of some aromatic tobacco varieties. Philippine Agriculturist 36: 27–46.

STEINBERG, ROBERT A. 1949. Greenhouse tests with chemicals for suppression of lateral branching of decapitated tobacco plants. Plant Physiol. 25: 103–113.

[6] Based on ₱2.50 for every 8 hours man labor and ₱2.00 for every 8 hours animal labor according to information received from Professor Alejandro B. Catambay of the Department of Agricultural Engineering.

[7] Ramos, *op. cit.*

TABLE 1.—*Mean increase in height of plants two weeks after topping*

BLOCK	TREATMENT				TOTAL	MEAN
	1	2	3	4		
	cm.	*cm.*	*cm.*	*cm.*	*cm.*	*cm.*
I	2.11	2.26	1.60	1.54	7.51	1.88
II	2.26	3.17	1.54	1.55	8.52	2.13
III	2.35	2.44	1.60	1.70	8.09	2.02
IV	2.75	2.29	1.80	1.52	8.36	2.09
Total	9.47	10.16	6.54	6.31	32.48	
Mean	2.37	2.54	1.64	1.58		

Analysis of variance

S.V.	D.F.	S.S.	M.S.	COMP.-F	TABULAR F-VALUE	
					0.01	0.05
Blocks	3	0.14	.047	0.61	6.99	3.86
Treatments	3	2.94	0.98	12.73	6.99	3.86
B × T	9	0.69	.077			
Total	15	3.77				

L.S.M.D. = 0.44

TABLE 2.—*Average number of leaves to a plant in a plot after topping*

BLOCK	TREATMENT				TOTAL	MEAN
	1	2	3	4		
I	32.33	36.88	36.25	37.60	143.06	35.77
II	40.56	33.57	39.20	35.50	148.83	37.21
III	36.11	41.86	34.86	40.56	153.39	38.35
IV	35.29	28.86	44.00	33.33	141.48	35.37
Total	144.29	141.17	154.31	146.99	586.76	
Mean	36.07	35.29	38.58	36.75		

Analysis of variance

S.V.	D.F.	S.S.	M.S.	COMP.-F	TABULAR F-VALUE	
					0.01	0.05
Blocks	3	22.45	7.48	0.37	6.99	3.86
Treatments	3	23.60	7.87	0.39	6.99	3.86
B × T	9	179.83	19.98			
Total	15	225.88				

TABLE 3.—*Yield of cured leaves in grams*

BLOCK	TREATMENT				TOTAL	MEAN
	1	2	3	4		
I	430.00	546.50	641.50	484.00	2102.00	525.50
II	510.00	638.90	643.60	438.00	2230.50	557.63
III	471.50	647.00	411.60	463.83	1993.90	498.48
IV	312.00	440.00	460.00	498.00	1710.00	427.50
Total	1723.50	2272.40	2156.70	1883.80	8036.40	
Mean	430.88	568.10	539.18	470.95		

Analysis of variance

S.V.	D.F.	S.S.	M.S.	COMP.-F	TABULAR F-VALUE	
					0.01	0.05
Blocks	3	36,835.05	12,278.35	1.86	6.99	3.86
Treatments	3	47,095.02	15,698.34	2.38	6.99	3.86
B × T	9	59,280.04	6,586.67			
Total	15	143,210.11				

THE RICE NEEDS OF THE PHILIPPINES [1]

C. Delmar Kearl [2]

PRODUCTION

In 1953, according to the best government estimates, 71.46 million cavans of rice were produced in the Philippines (table A). This rice was produced on 2.65 million hectares of land. The average yield to a hectare was 26.9 cavans.

The total production of rice in 1953 was the highest in the history of the Philippines. It was high because of a large increase in the area planted. The yield was only equal to the average of the 1920's and 1930's.

The production of rice after World War II has increased rapidly and to a level that about equals current consumption needs. In 1953 it was not necessary to import rice (table B).

IMPORTS

Rice imports were high in the years before and during World War I, averaging about ten per cent of the average annual production. Better yields and more hectares of land planted to rice enabled the country to reduce its imports to less than 3 per cent of production in the 1920's and to 1 per cent in the 1930's.

World War II disrupted production. Land was not used or was abused. Tools, carabaos, and other necessaries for production were lacking and farmers did not have the capital to obtain them. Political unrest was also a contributing factor. With this situation post-World War II imports have been necessarily high. Gradually, however, the shortages have been alleviated and the rice supply has been brought nearly into balance with the country's needs.

CONSUMPTION RATES

The question arises—What are the country's rice needs? Obviously the needs depend on the number of people, how much each of them eats, and how much they feed to their animals. The total production and imports of a country for a given year do not of course show the consumption since the surplus is not taken into consideration. The carry-over may be considerable. Data on yearly surplus are not available. Thus, individual annual consumption figures can only be rough estimates of the amount. Over a period of years, however, the production and imports must necessarily equal the country's consumption (table C).

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[1] Central Experiment Station Contribution No. 1806.

[2] Visiting associate professor of agricultural economics from Cornell University.

TABLE A.—*Palay production of the Philippines 1910–53*

YEAR	AREA PLANTED (MILLION HA.)	YIELD A HECTARE (CAVANS)	TOTAL PRODUCTION (MILLION CAV.)
1910	1.19	15.8	18.86
11	1.04	19.7	20.53
12	1.08	10.8	11.62
13	1.14	21.5	24.50
14	1.24	18.3	22.74
15	1.13	15.8	17.82
16	1.14	18.3	20.88
17	1.23	23.1	28.28
18	—[a]	—[a]	—[a]
19	1.39	24.3	33.78
20	1.48	24.5	36.34
21	1.67	24.8	41.48
22	1.66	26.2	43.44
23	1.68	26.1	43.79
24	1.74	23.9	41.57
25	1.73	26.4	45.65
26	1.76	27.2	47.78
27	1.81	27.4	49.50
28	1.79	27.9	49.92
29	1.78	28.0	49.79
30	1.81	28.5	51.58
31	1.79	27.7	49.64
32	1.78	26.5	47.30
33	1.85	25.8	47.84
34	2.00	26.4	53.00
35	1.96	23.3	45.83
36	2.05	20.6	42.22
37	2.06	26.7	55.02
38	1.91	27.4	52.35
39	1.83	22.7	41.49
40	2.08	25.8	53.70
41	2.29	23.6	54.13
42–45	N.A.	N.A.	N.A.
46	1.65	22.4	36.89
47	1.88	25.2	47.46
48	1.83	23.6	43.23
49	2.16	26.2	56.62
50	2.21	26.8	59.23
51	2.25	26.4	59.46
52	2.58	24.9	64.32
53	2.65	26.9	71.46

[a] Comparable data not available.
N.A.—Not available.

These data show a fairly low rate of consumption before and during World War I. The average was 2.85 cavans a person. During the 1920's the consumption was high, averaging 4.02 cavans a person. The 1930's brought the consumption rate down to 3.31 cavans.

The immediate post-World War II years were lean years. Rice available for consumption averaged only 2.22 cavans a person in 1946. Gradually the supply increased until the 1951-53 average

TABLE B.—*Palay production and imports of the Philippines 1910–53*

YEAR	TOTAL PRODUCTION (MILLION CAV.)	IMPORTS (MILLION CAV.)	TOTAL FOR CONSUMPTION [a] (MILLION CAV.)
1910	18.86	3.46	22.32
11	20.53	3.22	23.75
12	11.62	5.28	16.90
13	24.50	1.53	26.03
14	22.74	1.70	24.44
15	17.82	3.83	21.65
16	20.88	3.33	24.21
17	28.28	2.58	30.86
18	—[b]	3.22	—[b]
19	33.78	.89	34.67
20	36.34	1.36	37.70
21	41.48	1.04	42.52
22	43.44	.75	44.19
23	43.79	1.17	44.96
24	41.57	2.65	44.22
25	45.65	1.78	47.43
26	47.78	1.24	49.02
27	49.50	.22	49.72
28	49.92	.77	50.69
29	49.79	1.85	51.64
30	51.59	.19	51.78
31	49.64	.22	49.86
32	47.30	.23	47.53
33	47.84	.34	48.18
34	53.00	.12	53.12
35	45.83	.13	45.96
36	42.22	1.61	43.83
37	55.02	1.30	56.32
38	52.35	.16	52.51
39	41.49	1.52	43.01
40	53.70	.67	54.37
41	54.13	.42	54.55
42–45	N.A.	N.A.	N.A.
46	36.89	4.01	40.90
47	47.46	2.54	50.00
48	43.23	.86	44.09
49	56.62	1.36	57.98
50	59.23	.12	59.35
51	59.46	4.54	64.00
52	64.32	2.21	66.53
53	71.46	0	71.46

[a] Total consumption for each year is this figure plus carry-over at the beginning of the year minus surplus on hand at the end of the year. Data on carry-over are not available.

[b] Comparable data not available.

N.A.—Not available.

was almost the same as that of the years just before the war. In both periods imports were low and the total amount produced about equaled the total amount consumed.

TABLE C.—*Population and consumption of palay in the Philippines 1910–53*

YEAR	POPULATION (MILLIONS)	TOTAL FOR CONSUMPTION [a] (MILLION CAV.)	CAVANS A PERSON
1910	8.22	22.32	2.72
11	8.39	23.75	2.83
12	8.58	16.90	1.97
13	8.79	26.03	2.96
14	9.02	24.44	2.71
15	9.27	21.65	2.34
16	9.54	24.21	2.54
17	9.84	30.86	3.14
18	—	—[b]	—
19	10.32	34.67	3.36
20	10.45	37.70	3.61
21	10.67	42.52	3.98
22	10.91	44.19	4.05
23	11.15	44.96	4.03
24	11.40	44.22	3.88
25	11.67	47.43	4.06
26	11.93	49.02	4.11
27	12.21	49.72	4.07
28	12.50	50.69	4.06
29	12.79	51.64	4.05
30	13.09	51.78	3.96
31	13.40	49.86	3.72
32	13.72	47.53	3.46
33	14.05	48.18	3.43
34	14.39	53.12	3.69
35	14.73	45.96	3.12
36	15.08	43.83	2.91
37	15.44	56.32	3.65
38	15.81	52.51	3.32
39	16.00	43.01	2.69
40	16.46	54.37	3.30
41	16.77	54.55	3.25
42–45	—	N.A.	N.A.
46	18.43	40.90	2.22
47	18.79	50.00	2.66
48	19.23	44.09	2.29
49	19.51	57.98	2.97
50	19.88	59.35	2.99
51	20.26	64.00	3.16
52	20.65	66.53	3.22
53	21.04	71.46	3.40

[a] Total consumption is this figure plus or minus net carry-over.
[b] Comparable figures not available.
N.A.—Not available.

FUTURE NEEDS

With current production nearly in line with current needs—as shown by the fact that per capita consumption is now about equal to prewar rates and that importation was unnecessary in 1953— it is time to examine the future as well as is possible.

The population of the Philippines has been increasing at the rate of 1.9 per cent a year for some years now. If this rate continues there will be 4 million more people to feed by 1960. The total population will be about 24 million (table D). If these people will use

TABLE D.—*Anticipated rice needs of the Philippines*

PERIOD	POPULATION (MILLIONS)	AREA PLANTED (MILLION HA.)	YIELD A HECTARE (CAV.)	PALAY PRODUCTION (MILLION CAV.)	IMPORTS (MILLION CAV.)	TOTAL FOR CONSUMPTION (MILLION CAV.)	CAVANS A PERSON
	Pre-World War II						
1911–20 [a]	9.4	1.21	19.9	24.1	2.6	26.7	2.85
1921–30	11.8	1.74	26.6	46.5	1.2	47.7	4.02
1931–40	14.99	1.90	25.7	48.8	.6	49.4	3.31
	Post-World War II						
1946	18.4	1.65	22.4	36.9	4.0	40.9	2.22
1947	18.8	1.88	25.2	47.5	2.5	50.0	2.66
1948	19.2	1.83	23.6	43.2	.9	44.1	2.29
1949	19.5	2.16	26.2	56.6	1.4	58.0	2.97
1950	19.9	2.21	26.8	59.2	.1	59.3	2.99
1951	20.3	2.25	26.4	59.5	4.5	64.0	3.16
1952	20.6	2.58	24.9	64.3	2.2	66.5	3.22
1953	21.0	2.65	26.9	71.5	.0	71.5	3.40
	Projection						
1954	21.4 [b]	?	?	?	?	72.9	3.40
1955	21.8 [b]	?	?	?	?	74.3	3.40
1956	22.3 [b]	?	?	?	?	75.7	3.40
1957	22.7 [b]	?	?	?	?	77.2	3.40
1957	22.7 [b]	?	?	?	?	78.6	3.40
1959	23.6 [b]	?	?	?	?	80.1	3.40
1960	24.0 [b]	?	?	?	?	81.6	3.40

[a] Nine years only. Comparable data not available for 1918.
[b] Based on an annual increase of 1.9 per cent.

rice at the rate at which it was used just before World War I and during the last few years, about 82 million cavans of rice will be needed for annual consumption by 1960. This is an increase of about 15 per cent over today's production.

Where will this rice come from? Will some of it be imported? It is to be hoped not. With approximately 14 million hectares of potential cultivatable land still unused and with an average yield of only 26.9 cavans a hectare—the sixth to the lowest yield of 48 rice-producing countries in 1953—this country ought not to be spending any of its foreign exchange on rice importation.

To bring new land into cultivation almost always entails high costs—costs for roads, for clearing land, and for moving and settling people. Whether these costs are borne by the government or by the individual, they are high. However, bringing new land into cultivation is only one way of increasing rice land and rice production.

Another way to meet the rice needs is to substitute corn and other crops in livestock and human diets. If corn can be cheaply pro-

duced it can replace rice and thus effectively meet some of the rice consumption needs.

Still another way is to increase rice yields. Usually high yields are not the result of the adoption of one or two practices but of a well-rounded program of good crop management. Yields of rice in the Philippines today are no higher than they were during the 1920's and the 1930's in spite of a number of isolated programs all aimed at higher yields.

A rounded program of crop management is more than just adopting a few practices. It means using seeds that are adapted to the soil, climate, water, and other conditions on the farm. It means using the right analysis fertilizer for the soil and the crop. It means using land management practices such as rotating crops and applying compost and manure. It means controlling weeds by established and new methods. It means controlling water and drainage. It means preparing the land properly and planting correctly and on time. It means careful and timely harvesting. It means good drying and storage of the crop. It means careful, efficient milling. All of these are part of a program for better yields. Not one will prove very effective alone.

Increasing yields can probably be done more cheaply than bringing new land into production. However, both approaches and the substitution of corn should be used in solving the problem of the future needs for rice. This much we can be sure of —today's rice producers need not worry about a future market for their rice. The question for the future probably will not be what to do with the surplus but how to increase the production fast enough to keep pace with the growing population.

AN UNDESCRIBED SPECIES OF HELMINTHOSPORIUM ON KAPOK IN THE PHILIPPINES [1]

FAUSTINO T. ORILLO

WITH TWO TEXT FIGURES

On January 28, 1952, specimens of spotted leaves of kapok (*Ceiba pentandra* [Linn.] Gaertn.) were collected by the writer from the propagating plots of the Department of Agronomy, UP College of Agriculture, Laguna. About eighty per cent of the kapok seedlings in the plots were affected by the disease. A species of *Helminthosporium* was isolated from the spotted leaves and was subsequently proved to be pathogenic to kapok. The disease was also reproduced in the laboratory by inoculating kapok seedlings with a suspension of conidia scraped from leaves infected in the field.

SYMPTOMS OF THE DISEASE

The disease first manifests itself as circular yellow spots on any part of the lamina of the leaves. The borders are dull green-yellow which turn to amber yellow as the lesions become older. The spots are more or less circular in outline and vary in size, the majority attaining a diameter of 5 millimeters (fig. 1). As the lesions enlarge, the central portion changes to dark grayish brown because of the production of conidiophores and conidia of the causal fungus. In the advanced stage of the disease, adjacent lesions may coalesce and form large, irregular, blackish-brown patches. Observations in the field showed that the spots are more conspicuous and abundant on the older lower leaves than on the younger upper leaves. In the final stage of the disease, the affected portions form confluent patches of dead tissues, thus causing premature death of the leaves and subsequent defoliation of the plants.

CAUSAL FUNGUS

There is no record of the occurrence of *Helminthosporium* on kapok or closely related plants. Moreover, its characteristics do not fit any of the species of *Helminthosporium* previously recorded from the Philippines and elsewhere.[2] The Philippine kapok fungus, therefore, is regarded as a new species and the name *Helminthos-*

[1] Central Experiment Station Contribution No. 1807.

[2] A. P. Saccardo, "Sylloge Fungorum," Edwards Brothers, Inc., Ann Arbor, Michigan, 1886, Vol. 4, 807 pp.; 1892, Vol. 10, 964 pp.; 1895, Vol. 11, 752 pp.; 1899, Vol. 14, 1316 pp.

Fig. 1.—Kapok leaves attacked by *Helminthosporium ceibae*. Natural infection. (*Photographed by Photographic Division, College of Agriculture.*)

porium ceibae is proposed for it with the following diagnosis:

Helminthosporium ceibae sp. nov.[3]

Maculae brunneo-nigrae, forma circularis vel irregularis, diametro 1-5 mm. Hyphae granulosae, recentes subhyalinae, mature brunneae pallide; cellula hypharum 13.0 usque 58.9 × 13.4 usque 5.1μ; media mensura, 34.66 × 3.55μ. Conidiophores 2 vel 5 cumulantus, quasi castanoi coloris, minus castanoi vero in apice, 5-12 septatae, longitudine 115.2 usque 275.9μ, amplitudine 3.4 usque 8.5μ; media mensura, 205.52 × 6.94μ. Conidia in apice conidiophorum singulariter collocantus, subhyaline, mature quasi albi-castanae, 4-10 septatae, obclavate, recte vel quasi curvatim, apice acutae reddere, hilum conspicuum, longitudine 51.2 usque 110.9μ, amplitudine 11.9 usque 22.1μ; media mensura, 83.75 × 18.05μ; productione tubi germinum ab utroque apice germinando (fig. 2).

Hab. in foliis vivis Ceibae pentandrae. College of Agriculture, Los Baños, Laguna, Philippines.

Specimens of the type have been deposited in the pathological herbarium of the Department of Plant Pathology, UP College of Agriculture, Los Baños, Laguna, Philippines.

[3] The writer is grateful to Rev. Fr. Gregorio Raymundo, O.P., Colegio de San Juan de Letran, Manila, for assistance in preparing the Latin description of the fungus on kapok.

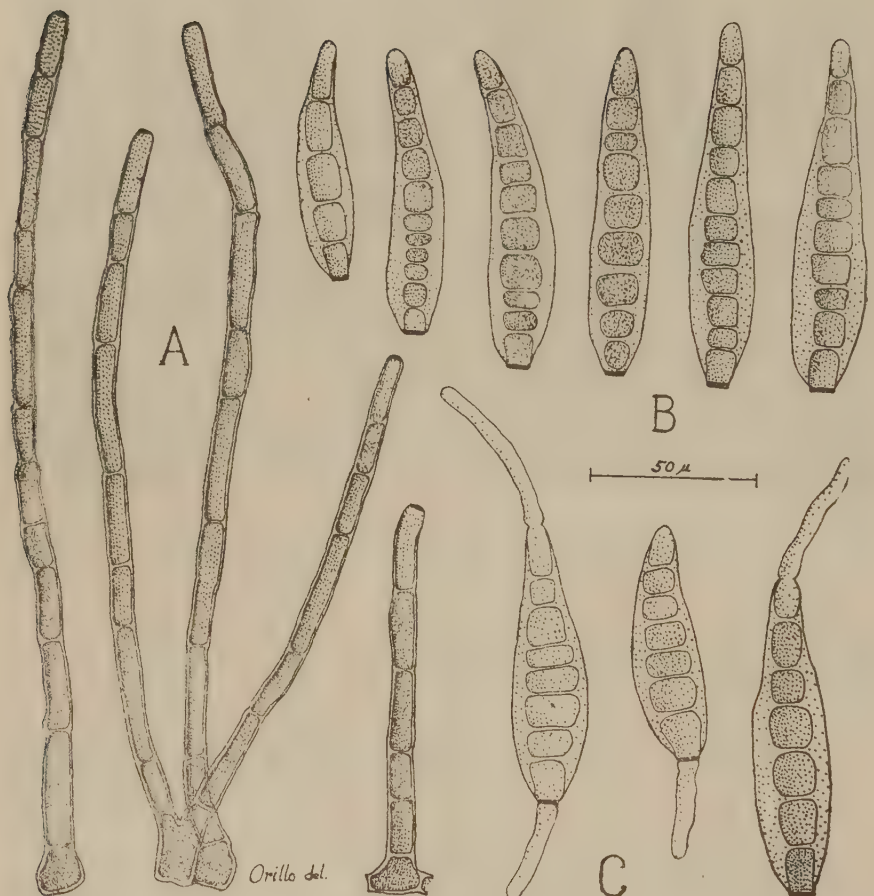

Fig. 2.—Camera lucida drawings of *Helminthosporium ceibae*: (A) conidiophores, (B) conidia, and (C) germinating conidia.

WATER CONSUMPTION OF TETHERED CATTLE AT DIFFERENT FREQUENCIES OF WATERING [1]

VALENTE VILLEGAS [2]

The amount of water drunk by Philippine cattle at two and at three waterings a day was significantly greater in each case than at one watering a day. The water consumed a day was the same at two waterings and three waterings. With Nellore cattle the amount of water drunk at two waterings a day was significantly more than at one watering a day. At three waterings a day, the consumption was greater than at two waterings a day.

Tethered cattle are watered at different frequencies in various parts of the Philippines. In Sto. Tomas, Batangas; Tuguegarao, Cagayan; Tacloban, Leyte; and Puerto Princesa, Palawan, tethered cattle are generally watered once a day in the afternoon. Places where tethered cattle are watered twice a day are Cebu City; Dagupan City; Bayombong, Nueva Vizcaya; Tagbilaran, Bohol; San Fernando, La Union; and the provinces of Quezon and Marinduque. In Batangas, Batangas, work bullocks are given water in the morning, at noon, and at 2 o'clock in the afternoon after plowing. In Los Baños, Laguna, watering is done by some at 1 o'clock in the afternoon only and by others at 9 o'clock in the morning and again at 3 o'clock in the afternoon.

This investigation was conducted in the Department of Animal Husbandry from March 6, 1951, to November 5, 1952, to determine the water consumption of tethered cattle at different frequencies of watering.

PROCEDURE OF THE INVESTIGATION

One Philippine bull, five Philippine cows, one Nellore bull, and four Nellore cows were used. The Philippine bull was approximately ten years old at the start of the investigation; the Philippine cows had an average age of eight years. The Nellore bull and Nellore cow No. 3 were about six years old at the start of the work, whereas the rest of the Nellore cows were advanced in age but not very old.

The cattle were tethered on rich pastures consisting mostly of cogon and culape (*Paspalum conjugatum* Berg.). They were watered once a day, twice a day, then thrice a day. The pail of water was

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[1] Central Experiment Station Contribution No. 1808. Presented at the Philippine Veterinary Medical Convention on May 20, 1954.

[2] The author is indebted to Mr. Jacinto Gallardo for assistance in this work. He also wishes to thank the district veterinarians at Cebu City, Tacloban, Leyte, and Lucena, Quezon; the provincial veterinarians of Palawan, Pangasinan, Nueva Vizcaya, Batangas, La Union, and Bohol; and the livestock inspector in-charge at Calapan, Mindoro, for furnishing data on the frequencies of watering tethered cattle in their localities.

weighed before and after watering each animal to determine the amount of water consumed.

Watering once a day took place between 11 o'clock in the morning and noontime; watering twice a day, between 7 and 8 o'clock in the morning and between 3 and 4 o'clock in the afternoon; and watering three times a day, between 7 and 8 o'clock in the morning, 11 and 12 o'clock in the morning, and 3 and 4 o'clock in the afternoon. One hundred and eighty determinations were made with the Philippine cattle for each of the three frequencies of watering. With the Nellore cattle, 150 waterings were made for each frequency.

DISCUSSION OF RESULTS

One watering. The amount of water consumed in one day by the Philippine bull ranged from 0.4 to 40.2 kilograms, the mean being 14.3 ± 2.11 kilograms.

Among the Philippine cows, the means varied from 6.7 ± 1.21 kilograms to 14.1 ± 2.13 kilograms a head a day; the range was from zero to 47.6 kilograms. The mean for all the cows was 9.9 ± 0.69 kilograms a head a day.

The range in the daily water consumption of the Nellore bull was from 3.5 to 60.9 kilograms. The mean was 19.2 ± 2.02 kilograms a day. With the Nellore cows, the amount of water drunk by each animal a day ranged from zero to 34.3 kilograms. The means were from 6.6 ± 1.10 to 12.2 ± 1.41 kilograms a head a day, and the mean for all the cows was 9.11 ± 0.65 kilograms.

Two waterings. The mean amount of water consumed by the Philippine bull a day was 25.2 ± 2.32 kilograms. The range was from 7.6 to 52.3 kilograms a head a day.

With the Philippine cows, the range was from zero to 40.6 kilograms a head a day. The means were from 8.1 ± 1.37 to 16.5 ± 1.54 kilograms a head a day; the mean for all the cows was 13.7 ± 0.68 kilograms.

When the Philippine bull and the Philippine cows were watered once and twice a day, the standard error of the difference between the two systems was found to be 6.0 ± 0.96, which is significant.

During the period of two waterings the Nellore bull sometimes did not drink water the whole day. Its maximum daily water consumption was 64.8 kilograms, and its mean daily consumption was 21.4 ± 2.96 kilograms.

The Nellore cows also refused to drink water some days. The largest amount of water drunk by one cow in one day was 40.5 kilograms. The minimum mean was 8.7 ± 1.33 kilograms a head a day, and the maximum mean was 13.9 ± 1.44 kilograms. The mean daily water consumption of all the cows was 11.5 ± 0.80 kilograms each.

Three waterings. The Philippine bull drank from zero to 53.5 kilograms of water a day, the mean being 23.2 ± 2.27 kilograms.

Among the Philippine cows, the range was from zero to 53.9 kilograms of water a head a day. The means ranged from 8.6 ± 1.10 to 18.6 ± 2.04 kilograms, and the mean for all the cows was 14.4 ± 0.72, which is significant. Between two waterings and three waterings, the standard error of the difference in the amount of water consumed was an insignificant 0.3 ± 0.91.

The minimum amount of water drunk by the Nellore bull in one day was 4.8 kilograms, and the maximum was 41.3 kilograms.

Two of the Nellore cows did not drink water one day even though they were watered three times. The maximum water drunk by the Nellore cows was 36.3 kilograms a head daily. The means ranged from 12.9 ± 1.66 to 17.1 ± 1.77 kilograms; the mean consumption was 15.3 ± 0.85 kilograms a head daily.

Between the once-a-day and the twice-a-day watering among the Nellore cattle, the standard error of the difference was 2.1 ± 1.19, which is not significant. Between one watering and three waterings, the standard error of the difference was 4.4 ±0.83, which is significant. Between two waterings and three waterings, the standard error of the difference was 2.4 ± 1.0, which is also significant.

CONCLUSION

The results of this investigation show that Philippine cattle should be watered twice a day, and Nellore cattle three times a day.

THE VALUE OF CORN GLUTEN FEED FOR DAIRY CATTLE AND SHEEP [1]

L. S. Castillo, L. E. Nazareno, and J. K. Loosli

The digestion coefficients of a concentrate mixture containing 85 per cent gluten feed and 15 per cent molasses were as follows: protein, 79.0; fat, 74.3; fiber, 59.4; and nitrogen-free extract, 81.5 per cent. Corn gluten feed contained 17.5 per cent digestible protein and 74.9 per cent total digestible nutrients.

The mixture containing corn gluten feed in place of corn meal and fish meal gave a somewhat greater milk production. Another concentrate mixture with 10 per cent cane molasses gave as good a milk yield as the control feed.

Corn gluten feed, usually called "gluten feed," is a by-product of the manufacture of commercial starch from corn grain. This feed was first produced in the Philippines last year, and some of it was exported because it did not find a ready market among livestock feeders.

In the United States gluten feed is fed mostly to dairy cattle. It has been given as the only or main concentrate with good results, but usually it forms 5 to 30 per cent of dairy concentrate mixtures.[2] Gluten feed is also considered satisfactory for sheep, beef cattle, and horses, but it is less useful for swine and poultry because of its deficiency in lysine and tryptophan.

Two experiments were conducted to learn the value of the locally produced gluten feed. In one experiment the digestibility of gluten feed by sheep was studied, and in the other, the value of gluten feed for lactating dairy cows.

DIGESTIBILITY OF GLUTEN FEED

Six sheep were used to determine the digestibility of gluten feed. The procedures were those described in an earlier report.[3] Water hyacinth silage was fed as roughage. Because the gluten feed was not readily eaten by the sheep when fed as the only concentrate, a mixture of 85 per cent gluten feed and 15 per cent cane molasses was tried. This combination was very palatable to the sheep.

Digestion coefficients for the gluten feed were calculated by difference, using values actually determined by feeding water hyacinth silage alone in a separate experiment [4] and Morrison's coefficients for the molasses.

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[1] Central Experiment Station Contribution No. 1809.

[2] F. B. Morrison, "Feeds and Feeding," Morrison Publishing Co., Ithaca, New York, 1951.

[3] J. K. Loosli, V. Villegas, G. V. Garcia, and L. A. Ynalvez, *Philippine Agriculturist*, **37**, 520 (1954).

[4] J. K. Loosli, R. P. Belmonte, V. Villegas, and E. Cruz, *Philippine Agriculturist*, **38**, 146 (1954).

The data on chemical composition of the corn gluten feed and the average digestion coefficients for the six sheep are summarized in table 1. For comparison Morrison's coefficients are also shown. The average digestibility of the protein and fat was higher in the present study than in Morrison's reports from research in the United States, whereas the digestibility of fiber and N.F.E. (nitrogen-free extract) was lower. Calculations show that the gluten feed contained 17.5 per cent of digestible protein and 74.9 per cent of T.D.N. (total digestible nutrients). Morrison's values were 21.9 per cent and 76.0 per cent, respectively.

LACTATION STUDY

Three Holstein-Friesians, three Red Sindhis, and three Holstein × Red Sindhi crossbreds were divided into groups of three with similar initial milk production. Each cow received three rations successively in the order prescribed by a 3 × 3 Latin square design. Each of the three periods lasted for four weeks. The cows were recently fresh at the start of the trial. Pasturage and soilage were fed as roughage. The concentrates (table 2) were fed in proportion to the amount of milk produced. The cows were fed more than the suggested amount of one-third kilogram of grain to every kilogram of milk produced because the pastures were overgrazed and the soilage was limited.

The chemical composition of the concentrate mixtures is summarized in table 3. The average milk production, fat tests, concentrate intakes, and changes in body weight for the four-week periods are shown in table 4.

Analyses of variance showed statistically significant differences ($P < 0.50$) in the milk production from the three concentrate mixtures. Production was greater from mixture II, which contained corn gluten feed in place of yellow corn, than from mixture I, the control. The differences in fat percentage of the milk were not statistically significant.

The results support the view that the corn gluten feed tested in this experiment was similar in value to yellow corn when used as a supplement to copra meal and rice bran for milking cows. In Europe and the United States, copra meal is often credited with effecting an increase in the fat percentage of milk. The present study was not extensive nor critical enough to throw any light on the problem.

Mixture I contained approximately five per cent fish meal, a very expensive imported feed. Considering the good results from mixtures II and III which were without fish meal, the conclusion that fish meal is not necessary in concentrates for dairy cows appears justified. Such a view is amply supported by research from other countries.

Cane molasses, an abundant and inexpensive feed in some areas of the Philippines, increased the palatability of the concentrate, which performed as well as the control feed, mixture I.

Additional tests are desirable to measure more accurately the value of the abundant by-product feeds for livestock in the Philippines.

TABLE 1.—*Composition and digestibility of the corn gluten feed*

ITEM	MOISTURE	PROTEIN	FAT	FIBER	N.F.E.	ASH
	per cent	*per cent*	*per cent*	*per cent*	*per cent*	*per cent*
Composition of corn gluten	8.4	22.2	3.1	6.6	58.6	1.0
feed	9.2	24.7	1.1	6.2	57.5	1.3
Percentage digested	—	79.0	74.3	59.4	81.5	—
Morrison's coefficients		73.0	67.0	80.0	90.0	—

TABLE 2.—*Ingredients of the concentrate mixtures*

INGREDIENT	I	II	III
	kg.	*kg.*	*kg.*
Yellow corn, ground	33⅓	—	—
Copra meal	33⅓	33⅓	20
Rice bran, fine	33⅓	33⅓	50
Fish meal	5	—	—
Molasses	—	—	10
Corn gluten feed	—	33⅓	20
Shells (oysters and clams)	1	1	1
Salt	1	1	1
	107	102	102

TABLE 3.—*Chemical composition of the concentrate mixtures*

MIXTURE NO.	MOISTURE	CRUDE PROTEIN	ETHER EXTRACT	CRUDE FIBER	N-FREE EXTRACT	ASH
	per cent	*per cent*	*per cent*	*per cent*	*per cent*	*per cent*
I	12.41	16.77	4.06	7.73	50.96	8.07
II	10.37	17.13	2.37	8.02	54.57	7.54
III	12.15	14.85	3.58	7.64	53.94	7.84

TABLE 4.—*Mean milk production, fat percentage, concentrate intake, and body weight changes*

ITEM	CONCENTRATE MIXTURE		
	I	II	III
Milk production, kilograms	230.9	245.8	237.1
Fat, per cent	3.70	4.12	4.20
Concentrate intake, kilograms	154.8	158.0	164.8
Weight gain, kilograms	3.2	−4.8	−2.8

NOTE ON THE PRESENCE ON SORGHUM OF SYMPTOMS LIKE THOSE OF THE FIJI DISEASE OF SUGAR CANE [1]

G. O. Ocfemia and M. S. Celino

WITH ONE TEXT FIGURE

In 1932 the virus *Galla fijiensis* Holmes of the Fiji disease of sugar cane was shown to be transmitted by the leafhopper, *Perkinsiella vastatrix* Breddin, Delphacidae (Ocfemia, 1933, 1934). For more than two decades afterwards no plant other than sugar cane was found to be susceptible to the disease. On December 24, 1954, however, the junior author found a stool of sorghum (*Andropogon sorghum* [Linn.] Brot.) in the Los Baños Economic Garden of the Bureau of Plant Industry which appeared much like sugar cane infected with Fiji disease. It had shortened stalks with stiff, short, and malformed leaves and elongate, straw-colored galls on the nether surface of the midrib, lamina, and leaf sheaths (fig. 1). On sugar cane the elongate galls are a reliable symptom of the Fiji disease.

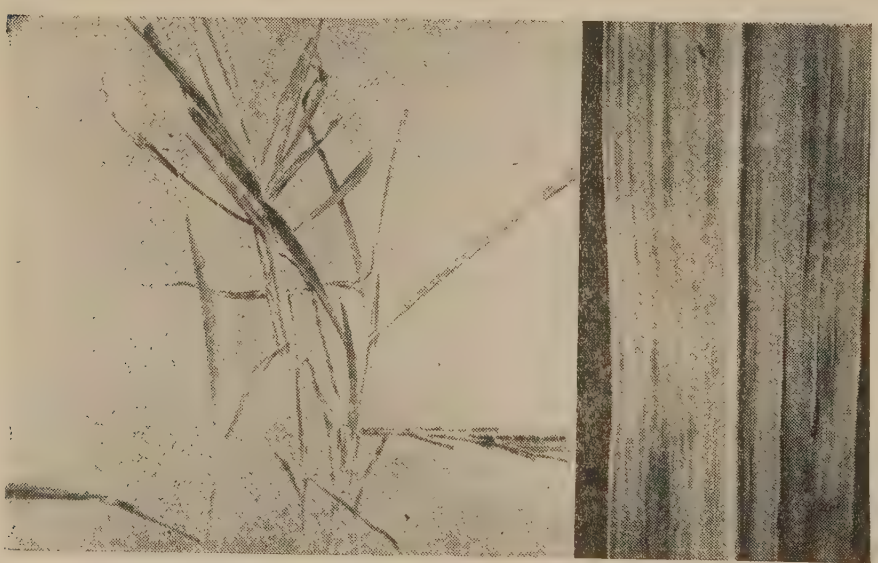

Fig. 1.—Left, a slender and dwarfed stalk of *Andropogon sorghum* (Linn.) Brot. with short, stiff, and malformed leaves like those of sugar cane with Fiji disease. Right, a small portion of the leaf of sorghum, slightly enlarged, showing the elongate, straw-colored galls, the most reliable symptom of Fiji disease of sugar cane. (*Photographed by the Photographic Division, College of Agriculture.*)

[1] Central Experiment Station Contribution No. 1810.

Fiji disease is one of the major diseases of sugar cane. It occurs in Fiji, Australia, and the Philippines, where it is said to have been introduced in 1916 with cuttings obtained from Fiji by way of Australia. In Australia inspection and roguing operations are maintained at the highest possible level with the object of finding Fiji-diseased stools and destroying them completely.

Fiji disease is very destructive to sugar cane. Once a cane stool is infected, the internodes of the stalks that appear become progressively shorter. For this reason no millable stalks are produced.

With the finding on sorghum of symptoms like those of the Fiji disease of sugar cane, the problem of suppression of the disease becomes more difficult. Along with studies on Fiji disease now in progress at the College of Agriculture at Los Baños, the writers are seeking the answers to the following questions: What are the other grasses that may be infected with Fiji disease and therefore serve as a reservoir of the virus for infecting sugar cane? What insects transmit the virus from sugar cane to sorghum? Will *Perkinsiella vastatrix* or other insect vectors transmit the virus from sugar cane to sorghum? The control of the Fiji disease in the Philippines requires answers to these questions.

COLLEGE AND ALUMNI NOTES

The amount of $34,000 has been appropriated by the Council of Economic and Cultural Affairs, a private American foundation established by John D. Rockefeller III, for agricultural economics research at the College to advance work in land tenancy, land use, and farm management. The grant was made through Cornell University which will administer it along the lines of the FOA contract. It was made possible through recommendations of Dr. J. Lossing Buck, agricultural economics expert of the Far East, who visited the country recently in connection with a study tour he was conducting for the foundation. The recommendations were based on needs listed by Dr. C. D. Kearl, visiting Cornell professor.

To implement a plan for irrigation studies by the Central Experiment Station and the Bureau of Plant Industry, some station and bureau personnel made a trip to Lamao Experiment Station on January 6 to select a site for rice experiments. Profs. P. R. Hoff and A. P. Aglibut, Carlos del Rosario and Petronio Ongkingko, agricultural engineering students, and Rollo de la Cuesta, student research assistant in agricultural botany, went with Dr. L. C. Kapp, FOA technical adviser, and Julian Bulanadi, senior agricultural engineer of DANR.

Amando M. Dalisay, '37, executive director of the National Economic Council, was elected president of the Farm Economics Association of the Philippines at elections held during a conference at the College on January 8. The association is composed of representatives from the National Economic Council, Department of Agriculture and Natural Resources, ACCFA, UP Colleges of Agriculture and Business Administration, and the Institute of Nutrition, with sitting-in representatives from FAO United Nations and FOA.

Other officers elected were Francisco M. Sacay, '25, vice-president; Andres D. Goseco, '51, secretary-treasurer; Pablo N. Mabbun, '23, and Jose E. Velmonte, directors.

The purpose of the association is to discover the needs of farm economics and remedy them through research, instruction, and extension.

Doctors Galvez, Cline, Villegas, and Turk and the Dean visited the Ubay and Malaybalay stock farms late in November to observe the response of forages to liming and fertilization. Soils of abaca and citrus areas in Davao were also studied.

Doctors Cline and Galvez met with BPI and BSC representatives and FOA's Orrben and Ream at Kapatalan Experiment Station in Laguna to study the possibility of using the area as the site of a coffee experiment station.

Nine faculty members of the College participated in an open forum on various phases of modern farming as part of the celebration of Farmer's Day held at the Maligaya Rice Experiment Station on December 18.

Doctors J. L. Brewbaker and A. M. Brunson were resource technicians on rice improvement, seed multiplication, and distribution; Dean L. B. Uichanco and Doctors F. T. Orillo and S. M. Cendaña, on plant pests and diseases; Professors A. B. Catambay and A. P. Aglibut, on farm mechanization, irrigation, and drainage; and Doctors S. N. Fertig and J. R. Velasco, on weeds and herbicides.

Dr. Otto A. Reinking discussed the zonification and mosaic control program underway in the Davao area, where he has served as consultant during the last three months, at a conference of the Cooperative Abacá Research Program of the College, BPI, and FOA held at the College on January 11. In the afternoon Doctors Umali and Brewbaker discussed the abacá breeding and cytological research now in progress.

Dr. Philip Vincent Gordon, director-general of the Food and Agriculture Organization of the United Nations, Rome, visited the College with members of his staff and some local UN officials on December 2. He was accompanied by Mrs. Leah Ivius Cardon; Miss Evelyn Younie, personal assistant; W. H. Cummings, regional representative of the director-general for Asia and the Far East; Miss Sue Keenan, UN Information, Manila; and M. D. Sumulong, FAO, Philippines. The officials were shown around by Dean Uichanco and Dr. Fronda. They were served lunch at the Department of Home Technology.

Engracio Basio, head librarian of the College, left on January 10 for a three-week survey of agricultural school libraries all over the country.

Nathaniel B. Tablante, '46, left for the United States January 9 to take up advanced studies in agricultural economics at Purdue University. He topped the government pensionado examinations given last July. At present he is connected with the Division of Agricultural Economics, DANR, detailed to the Philippine Information on Agriculture Office in Malacañang.

Dr. S. N. Fertig, visiting Cornell professor of agricultural botany, was the guest speaker at the scientific meeting of the Alpha Chi chapter of the Phi Sigma Biological Honor Society which was held January 16 at the Molawin Hall. Dr. Fertig talked on the control of weeds.

Paul B. Pearson of the US Atomic Energy Commission, Washington D.C., spent a day in Los Baños during his five-week trip in the Orient. He was shown around by the Dean.

Young Chul Chang, vice-director of the Central Agricultural Experiment Station in Suwon, Korea, also visited the College. Dr. F. M. Fronda acted as guide.

Mr. and Mrs. Ralph C. Hoeber, of the University of Hawaii, who are on a UP-Stanford University contract through FOA, were accompanied on a trip to the College by Dean and Mrs. Jose E. Velmonte of the UP College of Business Administration on December 10.

William D. Reeves of FOA, Manila, and Martin L. Laparan and S. A. Banilan, Irrigation Service Unit, Manila, were campus visitors on December 24.

Circulo Hispanista, a Spanish club advised by Instructors Joaquin P. Hilario and Sofronio R. Ladeza, inducted its officers at ceremonies preceded by assembly and a parade. Opening remarks were delivered by Mr. J. Hilario. The officers were proclaimed by W. Mendoza, physical education director. Closing remarks were delivered by Dr. K. L. Turk of the Department of Animal Husbandry.

Forty students were granted scholarships from private, university, college, and CASELF funds for the second semester of the school year 1954-1955.

The Los Baños ROTC unit field day was held on December 5. The sponsors' ball was held on the evening of December 11 at the Seniors' Social Garden. Presentation ceremonies of sponsors on December 15 were held at the parade grounds, followed by a parade and review. Another parade and review was held on January 17 in honor of Brig. Gen. Alfredo M. Santos, commander of the II MA. General Santos delivered a short address followed by closing remarks by Dean Uichanco.